

$$ax + b = 0$$

The coefficient  
of  $x$     constant term

1) write down the general form of a linear equation:

$$ax + b = 0$$

2) explain what is meant by the root or solution of a linear equation:

the value of  $x$  that when it got substituted into the equation, equation is balanced.

In question 2-8 verify that the given value is a solution of the given equation.

$$2) \quad 3j - 7 = 28, \quad j = -7$$

$$3j - 7 = 28$$

$$3j = 21$$

$$j = 21/3$$

$$\underline{j = 7}$$

$\therefore j = -7$  is  
not a solution.

$$3) \quad 8x - 3 = -11, \quad x = -1$$

$$8x = -8$$

$$x = -8/8$$

$$\underline{x = -1}$$

$\therefore x = -1$  is a solution.

$$4) 2s + 3 = 4, s = \frac{1}{2}$$

$$2s = 4 - 3$$

$$\underline{\underline{s = \frac{1}{2}}}$$

$\therefore s = \frac{1}{2}$  is a solution.

$$5) \frac{1}{3}x + 4/3 = 2, x = 2$$

$$\frac{1}{3}x + 4/3 = 2$$

$$x + 4 = 6$$

$$x = 6 - 4$$

$$\underline{\underline{x = 2}}$$

$\therefore x = 2$  is a solution.

$$6) 7t + 7 = 7, t = 0$$

$$7t + 7 = 7$$

$$7t = 7 - 7$$

$$t = 0/7$$

$$\underline{\underline{t = 0}}$$

$\therefore t = 0$  is a solution.

$$7) 11x - 1 = 10, \quad x = 1$$

$$11x - 1 = 10$$

$$11x = 11$$

$$x = 1/11$$

$$\underline{\underline{x = 1}}$$

$\therefore x = 1$  is a solution.

$$8) 0.01t - 1 = 0, \quad t = 100$$

$$100t - 100 = 0$$

$$100t = 100$$

$$t = 100/100$$

$$\underline{\underline{t = 1}}$$

$\therefore t = 100$  is NOT a solution.

## solving linear equation

$$3(t+7) = 5$$

$$2(t+7) = 15$$

$$2t + 14 = 15$$

$$2t = 15 - 14$$

$$\underline{\underline{t = 1/2}}$$

$$3(p-2) + 2(p+4) = 5$$

$$3p - 6 + 2p + 8 = 5$$

$$5p + 2 = 5$$

$$5p = 5 - 2$$

$$\underline{\underline{p = 3/5}}$$

$$2(x-5) = 3 - (x+6)$$

$$2x - 10 = 3 - x - 6$$

$$2x - 10 = -x - 3$$

$$2x + x = -3 + 10$$

$$3x = 7$$

$$\underline{\underline{x = 7/3}}$$

$$\frac{6}{1-2x} = \frac{7}{x-2}$$

$$6(x-2) = 7(1-2x)$$

$$6x - 12 = 7 - 14x$$

$$6x + 14x = 7 + 12$$

$$20x = 19$$

$$\underline{\underline{x = 19/20}}$$

$$I = I_1 + I_2$$

$$I_2 = 10, \quad I = 18, \quad I_1 = ?$$

$$I = I_1 + I_2$$

$$18 = I_1 + 10$$

$$I_1 = 18 - 10$$

$$\underline{\underline{I_1 = 8 \text{ A}}}$$

$$I = I_1 + I_2$$

$$I = 36, \quad I_1 = x, \quad I_2 = 5x$$

$$\therefore 36 = x + 5x$$

$$36 = 6x$$

$$\underline{\underline{x = 6}}$$

$$\therefore I_1 = \underline{\underline{6 \text{ A}}} \quad \text{and} \quad I_2 = \underline{\underline{30 \text{ A}}}$$

# Exercise

In questions 1-24 solve each equation:

$$1) 7x = 14$$
$$x = 14/7$$
$$\underline{\underline{x = 2}}$$

$$2) -3x = 6$$
$$x = 6/-3$$
$$\underline{\underline{x = -2}}$$

$$3) 1/2x = 7$$
$$x = 1/2(7)$$
$$\underline{\underline{x = 14}}$$

$$4) 3x = 1/2$$
$$6x = 1$$
$$\underline{\underline{x = 1/6}}$$

$$5) 4t = -2$$
$$t = -2/4$$
$$\underline{\underline{t = -1/2}}$$

$$6) 2t = 4$$
$$t = 4/2$$
$$\underline{\underline{t = 2}}$$

$$7) 4t = 2$$
$$t = 2/4$$
$$\underline{\underline{t = 1/2}}$$

$$8) 2t = -4$$
$$t = -4/2$$
$$\underline{\underline{t = -2}}$$

$$9) x/6 = 3$$
$$x = 6(3)$$
$$\underline{\underline{x = 18}}$$

$$10) x/6 = -3$$
$$x = -3(6)$$
$$\underline{\underline{x = -18}}$$

$$11) 7x + 2 = 9$$
$$7x = 9 - 2$$
$$x = 7/7$$
$$\underline{\underline{x = 1}}$$

$$12) 7x + 2 = 23$$
$$7x = 23 - 2$$
$$x = 21/7$$
$$\underline{\underline{x = 3}}$$

$$13) -7x + 1 = -6$$

$$-7x = -7$$

$$x = -7 / -7$$

$$\underline{\underline{x = 1}}$$

$$14) -7x + 1 = -13$$

$$-7x = -13 - 1$$

$$x = -14 / -7$$

$$\underline{\underline{x = 2}}$$

$$15) 17/3 t = -2$$

$$17t = -2(3)$$

$$17t = -6$$

$$\underline{\underline{t = -6/17}}$$

$$16) 3 - x = 2x + 8$$

$$3 - 8 = 2x + x$$

$$-5 = 3x$$

$$\underline{\underline{x = -5/3}}$$

$$17) x - 3 = 8 + 3x$$

$$-3 - 8 = 3x - x$$

$$-11 = 2x$$

$$\underline{\underline{x = -11/2}}$$

$$18) x/4 = 16$$

$$x = 16(4)$$

$$\underline{\underline{x = 64}}$$

$$19) \frac{x}{9} = -2$$

$$x = -2(9)$$

$$\underline{\underline{x = -18}}$$

$$20) -13/2x = 14$$

$$-13x = 28$$

$$\underline{\underline{x = -28/13}}$$

$$21) -2y = -6$$

$$y = -6/-2$$

$$\underline{\underline{y = 3}}$$

$$22) -7y = 11$$

$$\underline{\underline{y = 11/-7}}$$

$$23) -69y = -690$$

$$y = -690/-69$$

$$\underline{\underline{y = 10}}$$

$$24) -8 = -4x$$

$$x = -8/-4$$

$$\underline{\underline{x = 2}}$$

In questions 25-47 solve each equation:

$$25) 3y - 8 = 12y$$

$$3y - 12y = 8$$

$$-9y = 8$$

$$y = 8/-9$$

$$\underline{\underline{y = 8/(-9)}}$$

$$26) 7t - 5 = 4t + 7$$

$$7t - 4t = 7 + 5$$

$$3t = 12$$

$$t = 12/3$$

$$\underline{\underline{t = 4}}$$

$$27) 3x + 4 = 4x + 3$$

$$4 - 3 = 4x - 3x$$

$$\underline{\underline{x = 1}}$$

$$28) 4 - 3x = 4x + 3$$

$$4 - 3 = 4x + 3x$$

$$7x = 1$$

$$\underline{\underline{x = 1/7}}$$

$$29) 3x + 7 = 7x + 2$$

$$7 - 2 = 7x - 3x$$

$$4x = 5$$

$$\underline{\underline{x = \frac{5}{4}}}$$

$$30) 5(x+7) = 7(x+2)$$

$$5x + 35 = 7x + 14$$

$$7x - 5x = 35 - 14$$

$$2x = 21$$

$$\underline{\underline{x = \frac{21}{2}}}$$

$$31) 2x - 1 = x - 3$$

$$2x - x = -3 + 1$$

$$\underline{\underline{x = -2}}$$

$$32) 2(x+4) = 8$$

$$2x + 8 = 8$$

$$2x = 8 - 8$$

$$2x = 0$$

$$\underline{\underline{x = 0}}$$

$$33) -2(x-3) = 6$$

$$-2x + 6 = 6$$

$$-2x = 0$$

$$\underline{\underline{x = 0}}$$

$$34) -2(x-3) = -6$$

$$-2x + 6 = -6$$

$$-2x = -6 - 6$$

$$-2x = -12$$

$$\underline{\underline{x = 6}}$$

$$35) -3(3x-1) = 2$$

$$-9x + 3 = 2$$

$$-9x = -1$$

$$x = \frac{-1}{-9}$$

$$\underline{\underline{x = \frac{1}{9}}}$$

$$36) 2 - (2t+1) = 4(t+2)$$

$$2 - 2t - 1 = 4t + 8$$

$$1 - 8 = 4t + 2t$$

$$6t = -7$$

$$\underline{\underline{t = \frac{-7}{6}}}$$

$$37) 5(m-3) = 8$$

$$5m - 15 = 8$$

$$5m = 8 + 15$$

$$5m = 23$$

$$\underline{\underline{m = 23/5}}$$

$$38) 5m - 3 = 5(m-3) + 2m$$

$$5m - 3 = 5m - 15 + 2m$$

$$5m - 3 = 7m - 15$$

$$15 - 3 = 7m - 5m$$

$$2m = 12$$

$$\underline{\underline{m = 6}}$$

$$39) 2(y+1) = -8$$

$$2y + 2 = -8$$

$$2y = -8 - 2$$

$$y = -10/2$$

$$\underline{\underline{y = -5}}$$

$$40) 17(x-2) + 3(x-1) = x$$

$$17x - 34 + 3x - 3 = x$$

$$20x - 37 = x$$

$$20x - x = 37$$

$$19x = 37$$

$$\underline{\underline{x = 37/19}}$$

$$41) \frac{1}{3}(x+3) = -9$$

$$x + 3 = -27$$

$$\underline{\underline{x = -30}}$$

$$42) 3/m = 4$$

$$3 = 4m$$

$$\underline{\underline{m = 3/4}}$$

$$43) 5/m = 2/m + 1$$

$$5(m+1) = 2(m)$$

$$5m + 5 = 2m$$

$$5m - 2m = -5$$

$$\underline{\underline{m = -5/3}}$$

$$44) -3x + 3 = 18$$

$$-3x = 15$$

$$x = -15/3$$

$$\underline{\underline{x = -5}}$$

$$45) 3x + 10 = 31$$

$$3x = 31 - 10$$

$$3x = 21$$

$$x = 21/3$$

$$\underline{\underline{x = 7}}$$

$$46) x + 4 = \sqrt{48}$$

$$\underline{\underline{x = -4 + 2\sqrt{2}}}$$

$$47) x - 4 = \sqrt{23}$$

$$\underline{\underline{x = 4 + \sqrt{23}}}$$

$$48) \text{ if } y=2 \text{ find } x \text{ if } 4x+3y=9$$

$$4x+3y=9$$

$$4x+3(2)=9$$

$$4x+6=9$$

$$4x=9-6$$

$$\underline{\underline{x = 3/4}}$$

$$49) \text{ if } y=-2 \text{ find } x \text{ if } 4x+5y=3$$

$$4x+5y=3$$

$$4x+5(-2)=3$$

$$4x-10=3$$

$$4x=13$$

$$\underline{\underline{x = 15/4}}$$

50) if  $y=0$  find  $x$  if  $-4x + 10y = -8$

$$-4x + 10y = -8$$

$$-4x + 10(0) = -8$$

$$-4x + 0 = -8$$

$$x = -8/-4$$

$$\underline{\underline{x = 2}}$$

51) if  $x = -3$  find  $y$  if  $2x + y = 8$

$$2x + y = 8$$

$$2(-3) + y = 8$$

$$-6 + y = 8$$

$$y = 8 + 6$$

$$\underline{\underline{y = 14}}$$

52) if  $y = 10$  find  $x$  when  $10x + 55y = 530$

$$10x + 55y = 530$$

$$10x + 55(10) = 530$$

$$10x + 550 = 530$$

$$10x = 530 - 550$$

$$x = -20/10$$

$$\underline{\underline{x = -2}}$$

$$53) \text{ If } \gamma = 2 \text{ find } \beta \text{ if } 54 = \gamma - 4\beta$$

$$54 = \gamma - 4\beta$$

$$54 = 2 - 4\beta$$

$$54 - 2 = -4\beta$$

$$52 = -4\beta$$

$$\beta = 52 / -4$$

$$\underline{\underline{\beta = -13}}$$

In questions 54-63 solve each equation:

$$54) \frac{x-5}{2} - \frac{2x-1}{3} = 6$$
$$\frac{3(x-5) - 2(2x-1)}{2 \times 3} = 6$$
$$\frac{3x-15 - 4x + 2}{6} = 6$$
$$-13 - x = 36$$
$$\underline{\underline{x = -49}}$$

$$55) \frac{x}{4} + \frac{3x}{2} - \frac{x}{6} = 1$$

$$\frac{6x}{24} + \frac{36x}{24} - \frac{4x}{24} = 1$$

$$\frac{6x + 36x - 4x}{24} = 1$$

$$36x + 2x = 24$$

$$38x = 24$$

$$x = 24/38$$

$$\underline{\underline{x = 12/19}}$$

$$56) \frac{2x}{2} + \frac{4x}{3} = 2x - 7$$

$$\frac{3x + 8x}{6} = 2x - 7$$

$$\frac{11x}{6} = 2x - 7$$

$$11x = 6(2x - 7)$$

$$11x = 12x - 42$$

$$\underline{\underline{42 = x}}$$

$$57) \frac{5}{3m+2} = \frac{2}{m+1}$$

$$5(m+1) = 2(3m+2)$$

$$5m + 5 = 6m + 4$$

$$5m - 6m = 4 - 5$$

$$-m = -1$$

$$\underline{\underline{m = 1}}$$

$$58) \frac{2}{3x-2} = \frac{5}{x-1}$$

$$2(x-1) = 5(3x-2)$$

$$2x - 2 = 15x - 10$$

$$10 - 2 = 15x - 2x$$

$$13x = 8$$

$$\underline{\underline{x = 8/13}}$$

$$59) \frac{2x-3}{x+1} = 4$$

$$2x-3 = 4(x+1)$$

$$2x-3 = 4x+4$$

$$-3-4 = 4x-x$$

$$-7x = -7$$

$$\underline{\underline{x = -7/3}}$$

$$60) \frac{x+1}{x-3} = 4$$

$$x+1 = 4(x-3)$$

$$x+1 = 4x-12$$

$$1+12 = 4x-x$$

$$3x = 13$$

$$\underline{\underline{x = 13/3}}$$

$$61) \frac{y-3}{y+3} = 2/3$$

$$y-3 = 2/3(y+3)$$

$$3(y-3) = 2(y+3)$$

$$3y - 9 = 2y + 6$$

$$3y - 2y = 6 + 9$$

$$\underline{\underline{y = 15}}$$

$$62) \frac{4x+5}{5} - \frac{2x-1}{3} = x$$

$$3(4x+5) - 5(2x-1) = x(15)$$

$$12x + 15 - 10x + 5 = 15x$$

$$21 = 18x$$

$$x = 21/18$$

$$\underline{\underline{x = 7/6}}$$

$$63) \frac{3}{2s-1} + \frac{1}{s+1} = 0$$

$$3(s+1) + 2s - 1 = 0$$

$$3s + 3 + 2s - 1 = 0$$

$$\begin{aligned}
 5s + 2 &= 0 \\
 5s &= -2 \\
 s &= -2/5 \\
 \underline{\underline{s}}
 \end{aligned}$$

64) Solve the linear equation  $ax + b = 0$  to find  $x$ .

$$\begin{aligned}
 ax + b &= 0 \\
 ax &= -b \\
 x &= -b/a \\
 \underline{\underline{x}}
 \end{aligned}$$

65) solve the linear equation  $\frac{1}{ax+b} = \frac{1}{cx+d}$  ( $a \neq c$ ) to find  $x$ :

$$\begin{aligned}
 \frac{1}{ax+b} &= \frac{1}{cx+d} \\
 cx+d &= ax+b \\
 cx - ax &= b - d \\
 x(c-a) &= b-d \\
 x &= b-d/c-a \\
 \underline{\underline{x}}
 \end{aligned}$$